THE IDENTIFICATION AND CHARACTERIZATION OF A VIRUS CAUSING MOSAIC IN MERTENSIA VIRGINICA (L.) DC.

BY

INEZ AMANDA NIENOW

B.S., The Stout Institute, 1934
M.S., University of Minnesota, 1938

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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IN THE GRADUATE SCHOOL OF THE
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THE IDENTIFICATION AND CHARACTERIZATION OF A VIRUS CAUSING MOSAIC IN MERTENSIA VIRGINICA (L.) DC.

The kinds of studies that can be conducted in characterizing and identifying a plant virus are many. For identification of an unknown plant virus, the host range with observation of symptoms produced has been most frequently used. In recent years, serological methods have materially assisted in making identifications more accurate since it has been shown that plant viruses can act as antigens producing specific antibodies detectable by precipitin tests, flocculation tests, or by complement fixation tests. Further characterization of plant viruses may consist in studies of heat inactivation, effect of drying or aging, effect of dilution, tolerance to acid or alkali, oxidizing or reducing agents, filterability, particle size, purification and possible crystallization of the virus, electron microscope studies, and cross immunity tests with related strains. The following groups of studies were undertaken to identify and characterize a virus causing mosaic on *Mertensia virginica* (L.)DC., the common bluebell. Because it is a perennial infected plants harbor the virus throughout the winter months. As a perennial reservoir of virus, and since it is widely distributed in non-cultivated areas and along fence rows that may border commercial crops, the common bluebell can be of considerable significance in the spread of the disease to susceptible economic crops or ornamentals.

A *Mertensia virginica* (L.)DC. plant showing mosaic symptoms transmissible to Turkish tobacco was found in Urbana, Illinois, in 1946. A group of studies was devised to identify the virus causing the mosaic.

By inoculation into a wide host range of plants from many families, it was shown that the virus could be trans-

mitted to many plant families with symptoms of necrosis, mottling, stunting, deformities, the manifestation of a particular symptom dependent on the host plant. The virus produced the most severe symptoms on members of the Cucurbitaceae.

Since the virus produced local necrotic lesions on primary leaves of the cowpea, quantitative studies were possible. The virus was inactivated between 65 C.-70 C. in 10 minutes. Phosphate buffers added to infectious juice at a .1 M concentration increased the number of local lesions produced on the cowpea leaves. Highest infectivity was obtained when infectious juice was buffered at pH 6.5-7.0 with inactivation above pH 9.0 and possibly below pH 5.0. Studies indicated it was advisable to complete the inoculations with the virus within a 2 hour period if possible, since aging diminished its infectivity markedly. The length of time which the virus could remain viable in expressed juice at room temperature of 25 C. seemed to vary with the host plant and the age of the plant.

The virus was insect transmitted by *Myzus persicae* Sulzer, but was not seed transmitted through seed from infected *N. repanda, N. glutinosa* L., *N. tabacum* L.

Antiserum against the virus was obtained by intraperitoneal inoculations into rabbits of crude, infectious juice from petunia plants. Titers were demonstrated against the Mertensia mosaic in tobacco and cucumber and also against Doolittle's *Cucumis virus* I in tobacco.

The virus of Mertensia mosaic was identified as *Cucumis virus* I Smith, *Marmor cucumeris* var. *vulgare* Holmes. by:

1. Serological tests.
2. Cross protections tests with cucumber virus strains.
3. Host range with symptoms on respective hosts.
4. Insect transmission.

These studies establish *Mertensia virginica,* a perennial,

as a new host for *Marmor cucumeris* var. *vulgare* and identifies the cause of Mertensia mosaic as *Marmor cucumeris* var. *vulgare*.

VITA

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